



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/531,952

01/20/2006

Kazuya Tanaka

050246

4301

23850 7590 02/05/2010
KRATZ, QUINTOS & HANSON, LLP
1420 K Street, N.W.
Suite 400
WASHINGTON, DC 20005

EXAMINER

LACLAIR, DARCY D

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

02/05/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/531,952	Applicant(s) TANAKA ET AL.	
	Examiner Darcy D. LaClair	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 1 and 9-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. All outstanding rejections, except for those maintained below are withdrawn in light of the amendment filed on **1/12/2010**.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

Claim Rejections - 35 USC § 103

2. **Claims 2 and 7-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **McCarthy et al. (US 5,883,199)** in view of **Liu et al. (J. of Environmental Polymer Design, 1997)** and **Hiruma et al. (JP 2002-128918)** with evidence provided by **Hodson (US 2006/0240726)**.

In setting forth this rejection a machine translation of **JP 2002-128918** has been relied upon and all citations to paragraph numbers in the discussion below are with respect to the machine translation.

The examiner notes that the injection molded article of **Claims 7 and 8** is set forth in **product-by-process** format, and therefore the determination of patentability is based on the product itself. Nevertheless, as McCarthy teaches articles prepared by injection molding, this is set forth below.

With regard to Claim 2, McCarthy teaches biodegradable blends including polylactic acid based polymer and a second polymer including one or more polyesters,

Art Unit: 1796

where the first and second polymers are present in a ratio of 9:1 to 1:9. (See abstract)

The blend is made because polylactic acid based polymers have superior tensile and mechanical properties compared to PLA alone. (See col 2 line 10-21) The polylactic acid is at least 50 percent by weight. (See col 2 line 34-36) Blends with more than 20% weight of the aliphatic polyester have improvements in elongation toughness, and biodegradation rate. (See col 4 line 52-67) The second polymer is an aliphatic polyester such as polybutylenesuccinate-adipate copolymer, inter alia, and can contain a copolyester of an aliphatic polyester having up to 50% by weight of an aromatic polyester, such as terephthalate. (See col 2 line 37-45, col 6 line 5-12) This is an aliphatic-aromatic polyester. The blend can also include a compatibilizer which is a polyester. (See col 2 line 46-47) The amount of the compatibilizer is up to 10 percent. (See col 6 line 19-21) McCarthy specifically notes that the compatibility of PLA with some of the polyesters can be improved with the addition of a small amount of compatibilizer, such as Bionolle 3000. (See col 9 line 45-49)

McCarthy does not explicitly detail the T_g or ΔH_m of the other polyesters, but recommends diacids from the Bionolle family of polymers, such as 1000, 2000, 3000, 6000, and 7000 series. Hodson provides evidence as to the glass transition temperatures of Bionelle: 1001 has T_g of -30°C , 3001 has T_g of -35°C , and 6001 has T_g of -4°C . Therefore it is clear that McCarthy desires that the one or more polyesters have T_g below 0°C . Liu teaches that Bionolle is beneficially blended with PLA to improve the thermal and mechanical properties of the PLA (see abstract) and to provide good processability, physical properties, and resistance to water and solvents. (See p.

Art Unit: 1796

225 col 2) The Bionolle is used from 0 to 50% by weight (see p. 232 Table I) and Liui indicates that there is no melting peak detected until the content of Bionolle reached 20% by weight, suggesting that it should be employed at or above this level. (See p. 231 col 2) The preferred Bionolle for use in the PLA is 1001 and 3010. Bionolle 1001 has ΔH_m of 58.0 J/g. It is noted that while the ΔH_m for Bionolle 3010 is not known based on the currently applied references, based on the similar enthalpy behavior of this species (see p. 232, Table 1), it is the examiner's position that the has ΔH_m of 58.0 J/g. is similar to that of Bionolle 1001. Given that Liu teaches both Bionolle species 1001 and 3010 provide the benefits described above (improved properties, resistance to water and solvents) from 0 to 50%, particularly above 20%, it would be obvious to one of ordinary skill in the art to use either one, in particular, to use Bionolle 1001, at around or above 20% in the composition of McCarthy.

McCarthy teaches that the second polyester polymer portion of the blend can contain, in addition to the aliphatic polyester, a copolyester of an aliphatic polyester having up to 50% by weight of an aromatic polyester, such as terephthalate. (See col 2 line 37-45, col 6 line 5-12) Furthermore, McCarthy specifically exemplifies blends having polylactic acid and two polyesters. (See col 9, line 37-50) Hiruma teaches a polylactic acid-type polymer composition having an aromatic-aliphatic polyester resin component. (See par [0003]) This inclusion improves shock resistance (see par [0002]) and the aromatic aliphatic polyester of Hiruma is suitably biodegradable even with the aromatic component. (See par [0009]) Hiruma specifically exemplifies Ecoflex, an aromatic aliphatic polyester. (See par [0018]) Ecoflex is used by applicant, and has

Art Unit: 1796

a has ΔH_m of 21.6 J/g and T_g less than 0°C. It would be obvious to one of ordinary skill in the art to use Hiruma's aromatic-aliphatic polyester as the copolyester of an aliphatic polyester having up to 50% by weight of aromatic polyester of McCarthy in order to improve the shock resistance of the composition as taught by Hiruma. This component is consistent with applicants (B) polyester.

With regard to Claim 7, McCarthy teaches the blends are used to make film, sheets, and other products by methods such as blown film, extrusion, and injection molding methods. (See col 7 line 44-46)

With regard to Claim 8, Liu teaches that crystallinity reduces the molecular chain's mobility and increases the storage modulus of the blends. Crystalization of the blends is achieved during heating. (See p. 230 col 1) Processing and annealing conditions are important. The melt temperature of PLA is 210°C, and the T_g is around 60°C. (See p. 231, col 1) Furthermore, the films which are stretched exhibit melting peaks at 158°C and 156°C, (see p. 232 col 2) therefore the crystallization must be done above 60°C, but below about 150°C.

3. **Claims 4-5** are rejected under 35 U.S.C. 103(a) as being unpatentable over **McCarthy et al. (US 5,883,199)** in view of **Liu et al. (J. of Environmental Polymer Design, 1997)** and **Hiruma et al. (JP 2002-128918)** with evidence provided by **Hodson (US 2006/0240726)**, further in view of **Downie et al. (US 2001/0027225)**

The discussion of **McCarthy, Liu, Hiruma and Hodson**, above in **paragraph 2** is incorporated here by reference.

Art Unit: 1796

With regard to Claim 4, McCarthy focuses on the biodegradability of the blends (See abstract) and teaches that the blends can be used to manufacture a variety of products (see col 7 line 45-54), and that modifications are within the scope of the invention. (See col 12 line 20-23) Hiruma teaches that additives can be included to adjust various physical properties. (See par [0011]) Neither explicitly teaches a carbodimide compound. Downie teaches a process for manufacturing polymers containing a degradant component that increases the rate of polymer degradation. (See Abstract) Applicable polymers include polyesters. (See par [0076]) The degradant component is typically added in an amount from about 0.01 to 10 percent (see par [0097]) and can be carbodiimides (see par [0094]). It would be obvious to one of ordinary skill in the art to incorporate such a degradant compound in order to better achieve the aim of the invention, which is to provide a biodegrading resin composition.

With regard to Claim 5, Downie teaches that an inhibitor component is also added to the resin from about 0.01 to 10 percent by weight to stabilize the composition during processing. (See par [0099]) The inhibitor component can be an antioxidant and a preferred species is 3,5-bis(1,1-dimethyl ethyl)-4-hydroxy-octadecyl ester. (See par [0102]) It would be obvious to add this inhibitor component in order that the polymer is not degraded during production of the material.

4. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over **McCarthy et al. (US 5,883,199)** in view of **Liu et al. (J. of Environmental Polymer**

Art Unit: 1796

Design, 1997) and **Hiruma et al. (JP 2002-128918)** with evidence provided by **Hodson (US 2006/0240726)**, further in view of **Akao et al. (US 5,814,497)**

The discussion of **McCarthy, Liu, Hiruma and Hodson**, above in **paragraph 2** is incorporated here by reference.

With regard to Claim 6, McCarthy teaches that the blends can be used to manufacture a variety of products (see col 7 line 45-54), and that modifications are within the scope of the invention. (See col 12 line 20-23) Hiruma teaches that colorants can be added to adjust various physical properties. (See par [0011]) While colorants are generic to a hiding agent, neither McCarthy or Hiruma explicitly teaches a type or content of hiding agent. Akao teaches colored compositions for use in polymeric packaging materials (see col 1 line 1-15) which can be used in a variety of resins (see col 5, 6) which can include biodegradable polymers such as polycaprolactone and Biopol (col 11 line 38-59) Akao teaches inorganic pigments which can be used, and those which are preferable have a high refractive index. Representative examples include titanium oxide, having a refractive index over 2.5, silicon carbide (2.67), zinc oxide (2.37), antimony oxide (2.35), and others (see col 17 line 5-20) as well as carbon black as a black pigment (see col 15 line 34-35). One material will have 0.2 to 50 parts by weight of carbon black per 100 parts of resin (see col 3 line 43-50), and one master batch contains 5 to 60 weight percent of the light shielding material (pigment) (see col 2 line 60), which is used in 100 parts with 300 parts of thermoplastic resin. (See col 3 line 53-55) This would be about 1 to 15 parts by weight of inorganic pigment, therefore Akao teaches a range which encompasses applicant's range. Given that Akao teaches

Art Unit: 1796

specific details with regard to achieving effective pigmentation or hiding, it would be obvious to one of ordinary skill in the art to use an inorganic pigment such as those taught by Akao in the content taught as effective for achieving coloration or light shielding by Akao to pigment the composition of McCarthy in view of Liu and Hiruma.

5. **Claims 3 and 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **McCarthy et al. (US 5,883,199)** in view of **Liu et al. (J. of Environmental Polymer Design, 1997)** and **Hiruma et al. (JP 2002-128918)** with evidence provided by **Hodson (US 2006/0240726)**, further in view of **Obuchi et al. (US 6,916,950)** with *evidence* from **Wypych (2000)** (pages indicated below).

The discussion of **McCarthy, Liu, Hiruma and Hodson**, above in **paragraph 2** is incorporated here by reference.

The examiner notes that the injection molded article of **Claim 8** is set forth in ***product-by-process*** format, and therefore the determination of patentability is based on the product itself. Nevertheless, as McCarthy teaches articles prepared by injection molding, this is set forth below.

With regard to Claim 3, McCarthy teaches that the blends can be used to manufacture a variety of products (see col 7 line 45-54), and that modifications are within the scope of the invention. (See col 12 line 20-23) Hiruma teaches that inorganic fillers, colorants, stabilizers, and the like can be added to adjust various physical properties. (See par [0011]) Neither explicitly teaches a size for the filler. Obuchi teaches a polyester composition having 25% to 75% of a lactic acid based polymer and

Art Unit: 1796

25% to 75% of other aliphatic polyester, and 0.1 to 70 parts of a crystalline inorganic filler. (See abstract) This is composed of SiO_2 and talc, kaolin, clay, and kaolinite.

(See col 7 line 27-32) Typical particle sizes commercially available are shown below. It would be obvious to one of ordinary skill in the art to select commercially available fillers in a typical size for those fillers taught by Obuchi. As demonstrated by the table below, the fillers recited by Obuchi are consistent with the size range claimed by applicant.

Filler	Pages of Wypych	Size (μm)
Talc	150-153	1.4 - 19
Silica	131-146	5-40 (fumed) 4-28 (fused) 1-40 (precipitated) 2-19 (quartz) 2-90 (sand) 2-15 (silica gel)
Clay	75-76	0.4 - 5

With regard to Claim 8, Obuchi teaches that containers and packaging materials obtained by common injection molding have a disadvantage in thermal resistance, so containers for hot water or use in a microwave oven can be inadequate. (See col 1 line 45-50) By crystallizing, the resin is given thermal resistance, and therefore improved. The inventors have disclosed a technique for mixing polylactic acid with crystalline SiO_2 (silica) and holding the mold at a temperature of 85-125°C in order to crystallize the resin in the mold. (See col 3 line 13-22) It would be obvious to one of

Art Unit: 1796

ordinary skill in the art to take this additional step in order to give thermal resistance to products such as those disclosed by McCarthy. (See col 7 line 45-54)

Response to Arguments

6. Applicant's arguments filed **1/12/2010** have been fully considered. Specifically, applicant argues

(A) Applicant maintains the argument made in the response dated 6/9/2009, arguing that the rejection requires modifying the content of lactic acid based resin in Bastioli, but there is no suggestion for such a modification; in particular, a maximum of 30% of the lactic acid based resin is disclosed, whereas Claim 2 requires a lactic acid resin content of at least 45%. The examiner states that the upper limit of 30% for component C in the stated range of 5 to 30% in Bastioli does not represent a true upper limit; the examiner refers to Bastioli's low content prohibition (p. 9 par 4); applicant notes that this merely gives an explanation as to why concentrations of C polymer below 5% are not part of Bastioli's invention, but makes no comment on the upper limit of 30%; the fact that Bastioli has not provided an explicit reason for the stated upper limit of 30% does **not** mean that there is no teaching in the reference against values above 30%: The explicit teaching of an upper range limit of 30% is, in itself, a teaching against values above 30%. The teachings of Kanamori are specific to a binary system, and is not a general teaching that a high ratio of lactic acid is good in any composition. Furthermore, Bastioli's own data demonstrate that increasing the lactic acid concentration causes inferior performance.

Art Unit: 1796

7. **With respect to argument (A)**, applicant's arguments have been considered, but are moot in view of the rejection set forth above.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Darcy D. LaClair whose telephone number is (571)270-5462. The examiner can normally be reached on Monday-Friday 8:30-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Milton Cano can be reached on 571-272-1398. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Milton I. Cano/
Supervisory Patent Examiner, Art Unit 1796

Darcy D. LaClair
Examiner
Art Unit 1796

/DDL/

Application/Control Number: 10/531,952
Art Unit: 1796

Page 12